[redacted] No. 7506.02 STATINTL

STATEMENT OF WORK

for

[redacted] STATINTL

16 June 1964

[redacted] STATINTL

Approved For Release 2002/06/17 : CIA-RDP78B04747A001500020005-9

STATEMENT OF WORK

for

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STATINTL 1.0 SCOPE

1.1 This document describes the work to be performed by [redacted], for the design and fabrication of two each high resolution direct image optical viewer systems STATINTL under [redacted]

1.2 The scope of work includes the purchase and modification of lenses, design and fabrication of condenser and field lenses, and other miscellaneous optical elements, which when assembled together will comprise two each complete Experimental Direct Image Viewer Optical Systems.

2.0 APPLICABLE DOCUMENTS

This work statement is based upon information contained within the following documents, which are incorporated herein by reference.

STATINTL 2.1 [redacted]-S-7506, Experimental Direct Image Viewer, Specification for

3.0 REQUIREMENTS

3.1 Optical Elements

A quantity of two of each optical component described below is required except for Item 3.1.4.

3.1.1 Field Lenses

3.1.1.1 The multi-element field lenses shall be of a symmetrical design and each half separately mounted to allow installation and mounting of two diffraction gratings between the cells.

3.1.1.2 A flange type mounting arrangement shall be incorporated into the support cell structure. A 1-inch or greater spacing shall exist between the two cell structures and mounting flanges when in use.

3.1.1.3 The lens shall be approximately 15 inches in diameter (allow full coverage for 10 inch x 10 inch ruled grating) and of a focal length which will image the objective lens exit pupil 20 inches from the rear nodal point of the field lens.

3.1.1.4 The lens shall be capable of operating with, and not degrading, an objective lens capable of presenting to the observer, information from a 200 lines per millimeter low contract (1.6:1) target.

3.1.2 50X - Components

3.1.2.1 A commercial large aperture photographic lens shall be procured and modified to provide an adjustable square diaphragm (exit pupil). The characteristics of this item shall be as follows:

a. Flange or barrel threaded mounting.

b. The exit pupil, shall be square and as large as possible and compatible with 3.1.2.1.c.

c. The focal length shall be 1 inch plus or minus 5%, provided this is commercially available.

d. The resolution goal of the lens when operating at 50X shall be 200 lines per millimeter as seen in the object plane on a low contrast (1.6:1) target. The lens shall be selected to approach this objective as close as possible when testing with the wavelength band selected for the viewer. The AWAR resolution of the lens shall be not less than 200 lines per millimeter (high contrast), provided this is commercially available.

e. The image presented to the observer shall be an area 10 inches x 10 inches square.

3.1.2.2 A multi-element condenser system mounted in a cell shall be provided with the following characteristics:

a. It is preferred, but not required, that the cells have flange-type mounting.

b. The condenser system shall fill the objective lens and a .2 x .2 area on the film plane.

c. The front surface of the condenser shall be half an inch or more from the film plane to provide adequate mechanical clearance.

3.1.2.3 Unmounted field flatteners shall be provided as required.

3.1.3 5X - Components

3.1.3.1 A commercial 8.5 inch focal length lens shall be procured and modified to contain an adjustable square diaphragm (exit pupil). The characteristics of this item shall be as follows:

a. The exit pupil, when viewed by the field lens, shall provide an opening the same as that chosen under 3.1.2.1.b.

b. This lens shall have a resolution, over the used field, of 60 lines per millimeter AWAR referred to a high contrast target in the object plane, and when tested with light of the wavelength band selected for the viewer.

3.1.3.2 A multi-element condenser system mounted in a cell shall be provided with the following characteristics:

a. It is preferred, but not required, that the cells have flange-type mounting.

b. The condenser system shall fill the aperture of the projection lens and a 2½ inch square area on the film.

c. The front surface of the condenser shall be ½ inch or more from the film plane to provide adequate mechanical clearance.

3.1.3.3 Two separate and identical small path deflecting mirrors mounted in cells shall be provided as follows:

a. Each mirror shall be between 2-2½ inches in diameter .

b. The mirrors shall be flat over their surface to ¼ wavelength.

3.1.3.4 Unmounted field flatteners shall be provided as required.

3.1.4 Light Source Components

Individual light source components appropriate for 50X and 5X viewing magnification as described herein shall be supplied as a part of this procurement.

3.1.4.1 Reflectors. Two shall be supplied, one for each magnification.

3.1.4.2 Filters

a. Interference filters shall be supplied for the elimination of the unwanted wavelengths of the light source. (Two required, one for each magnification.)

b. Heat absorbing filters shall be supplied with each condenser system.

3.1.4.3 The illumination system (reflector lamp, condenser) shall be selected to meet the following specification at both 50X and 5X where the lowest transmission in any order of each grating is 7 per cent of the input.

3.1.4.4 Intensity specification of viewer. The viewer optics shall be designed such that it allows the measurement of a density difference of 0.05 (desirable density difference of 0.02) and this difference can be visually discriminated over a required density range of 0 to 1.8 with a design goal of 0 to 2.5.

3.2 Technical Specification Report

This report shall consist of the technical data related to the above optical components, along with the required drawings so that STATINTL upon receipt of this report, may proceed with the design and fabrication of the viewer. The items listed below are examples of what the report will contain.

3.2.1 Drawings showing the mounting arrangement of the field lens, objective lenses, condensers, and reflectors.

3.2.2 Focal length of all optics.

3.2.3 Optical distances between components specified in both flange distances and nodal point distances.

3.2.4 Illumination calculations, light source and wavelength selection. A narrow wavelength band shall be used.

3.2.5 Lamp power supply information, sufficient in STATINTL nature to allow [ ] to incorporate the unit into the overall viewer design.

3.3 Engineering, Design and Description Report

This report shall contain an engineering and design description of the technical aspects of the Diffraction Viewer Optical System for integration into the engineering instruction manual. The items listed below are some of the contents of this report.

3.3.1 Technical discussions explaining the optical principles of the diffraction viewer.

3.3.2 Design consideration of the optics.

3.3.3 Consideration of an estimate of the Modulation Transfer Function of the optical system will be given (to be resolved at initial project review meeting.)

3.3.4 Instructions relating to adjustment and cleaning of the optical components.

3.4 Meetings

During the duration of the project, periodic technical meetings will be held to review the progress of the project. The various review and progress meetings will, in most cases, STATINTL occur at [ ] with the mutual agreement of the parties concerned.

4.0 SCHEDULE

The above items shall be delivered to [ ] in STATINTL concurrence with the schedule listed below:

4.1 First optical system, of the two produced (one each of the items in Section 3.1) shall be delivered not later than six (6) months after receipt of order.

4.2 The second optical system (one each of the items in Section 3.1) is not required until ten (10) months after receipt of order.

4.3 The Technical Specification Report (Item 3.2) is required two months after receipt of order.

4.4 The Engineering Design and Description Report (Item 3.3) is required seven months after receipt of order. STATINTL

4.5 One month after receipt of order, [redacted] shall provide specification data relating to the required line spacing and wave length characteristics of the diffraction grating as specified in [redacted]-S-7506. STATINTL